

**CPC****COOPERATIVE PATENT CLASSIFICATION****B61L****GUIDING RAILWAY TRAFFIC; ENSURING THE SAFETY OF RAILWAY TRAFFIC**

(power supply lines for electrically-propelled vehicles B60M; vehicle signalling in general B60Q; brakes or auxiliary equipment B61H, B61K; point or crossing construction E01B; insulated rail joints [E01B 11/54](#); optical devices in general G02; controlling in general G05; electric communication technique H04)

**B61L 1/00**

**Devices along the route controlled by interaction with the vehicle or vehicle train, { e.g. pedals}**(detonators [B61L 5/20](#); operation of points or signals by passage of the vehicle [B61L 11/00](#), [B61L 13/00](#); central traffic control systems controlled by train [B61L 27/04](#); operation of gates, or gates and signals, by approaching vehicle [B61L 29/18](#))

**B61L 1/02**

. Electric devices associated with track {e.g. rail contacts}

**B61L 1/025**

.. {actuated by variation of resistance or by piezo-electricity}

**B61L 1/04**

.. mechanically actuated by a part of the vehicle

**B61L 1/045**

... {actuated by fluid-pressure}

**B61L 1/06**

.. actuated by deformation of rail; actuated by vibration in rail

**B61L 1/08**

.. magnetically actuated; electrostatically actuated

**B61L 1/10**

.. actuated by electromagnetic radiation; actuated by particle radiation

**B61L 1/12**

. Electric devices associated with overhead trolley wires

**B61L 1/14**

. Devices for indicating the passing of the end of the vehicle or vehicle train

**B61L 1/16**

. Devices for counting axles; Devices for counting vehicles (counting moving objects in general [G06M](#))

**B61L 1/161**

.. { characterised by the counting methods}

**B61L 1/162**

.. { characterised by the error correction}

**B61L 1/163**

.. { Detection devices}

**B61L 1/164**

... { Mechanical}

**B61L 1/165**

... { Electrical}

**B61L 1/166**

... { Optical}

**B61L 1/167**

.. { Circuit details}

**B61L 1/168**

.. { Specific transmission details}

**B61L 1/169**

.. { Diagnosis}

**B61L 1/18**

. Railway track circuits (automatically-operated track circuits specially adapted for section blocking for controlling traffic [B61L 23/00](#); rail joints [E01B 11/00](#))

**B61L 1/181**

.. {Details}

**B61L 1/182**

... {Use of current of indifferent sort or a combination of different current types}

**B61L 1/183**

.... {Use of means on the vehicle for improving short circuit e.g. in vehicles with rubber bandages}

B61L 1/184	.... {Use of additional conductors for examining leakages between rails}
B61L 1/185	... {Use of direct current}
B61L 1/186	... {Use of rectified alternating current}
B61L 1/187	... {Use of alternating current}
B61L 1/188	... {Use of coded current}
B61L 1/20	. Safety arrangements for preventing or indicating malfunction of the device, e.g. by leakage current, by lightning {remote indicating means for abnormal operations conditions <a href="#">G08B 21/00</a> , <a href="#">G08B 23/00</a> ; detectors for indicating the overheating of axle bearings <a href="#">B61K 9/00</a> }
<b>B61L 3/00</b>	<b>Devices along the route for controlling devices on the vehicle or vehicle train, e.g. to release brake, to operate a warning signal</b>
B61L 3/002	. {Recorders on the vehicle}
B61L 3/004	. { Memory means reproducing during the running of the vehicle or vehicle train, e.g. smart cards}
B61L 3/006	. { On-board optimisation of vehicle or vehicle train operation ( <a href="#">track-side optimisation of operation <a href="#">B61L 27/0027</a></a> )}
B61L 3/008	. { On-board target speed calculation or supervision ( <a href="#">track-side control of safe travel <a href="#">B61L 27/0038</a></a> ; <a href="#">speed control circuitry <a href="#">B60L 3/08</a></a> ; <a href="#">speed control of electric drives <a href="#">B60L 15/20</a></a> )}
B61L 3/02	. at selected places along the route, e.g. intermittent control { <a href="#">simultaneous mechanical and electrical control</a> }
B61L 3/04	.. controlling mechanically { <a href="#">arrangements of making elements acting directly on tread <a href="#">B60T 1/04</a></a> }
B61L 3/06	.. controlling by electromagnetic or particle radiation, e.g. by light beam ( <a href="#">using radio waves <a href="#">B61L 3/12</a></a> )
B61L 3/065	... {controlling optically}
B61L 3/08	.. controlling electrically
B61L 3/10	... using current passing between devices along the route and devices on the vehicle train
B61L 3/103	.... {Details of current transmitting conductors or contact brushes}
B61L 3/106	.... { with mechanically controlled electrical switch on the vehicle}
B61L 3/12	... using magnetic or electrostatic induction; using radio waves
B61L 3/121	.... {using magnetic induction}
B61L 3/125	.... { using short-range radio transmission ( <a href="#">long-range radio transmission <a href="#">B61L 15/0027</a>, <a href="#">B61L 27/0005</a></a> )}
B61L 3/126	.... { Constructional details}
B61L 3/127	.... { for remote control of locomotives ( <a href="#">remote control of locomotives within a train consist <a href="#">B61C 17/12</a></a> )}
B61L 3/128	.... { for control of tilting trains by external control devices, e.g. by Eurobalise ( <a href="#">tilting details <a href="#">B61F 5/22</a></a> )}
B61L 3/14	.. to cut-off the power supply to traction motors of electrically-propelled vehicles

- B61L 3/16 . Continuous control along the route
- B61L 3/18 . . using electric current passing between devices along the route and devices on the vehicle or vehicle train
- B61L 3/185 . . . {using separate conductors}
- B61L 3/20 . . . employing different frequencies or coded pulse groups {e.g. using currents carried by traction current (operating and signalling systems using network power supply [H02J 13/00](#))}
- B61L 3/22 . . using magnetic or electrostatic induction; using electromagnetic radiation
- B61L 3/221 . . . {using track circuits}
- B61L 3/222 . . . . {Arrangements on the track only}
- B61L 3/225 . . . {using separate conductors along the route}
- B61L 3/227 . . . {using electromagnetic radiation}
- B61L 3/24 . . . employing different frequencies or coded pulse groups {e.g. in combination with track circuits}
- B61L 3/243 . . . . {using alternating current}
- B61L 3/246 . . . . {using coded current}
  
- B61L 5/00** **Local operating mechanisms for points or track-mounted scotch-blocks** (track-mounted scotch-blocks per se [B61K](#)); **Visible or audible signals; Local operating mechanisms for visible or audible signals** ([B61L 11/00](#) takes precedence)
  
- B61L 5/02 . Mechanical devices for operating points or scotch-blocks {e.g. local manual control}
- B61L 5/023 . . {using funicular driving means}
- B61L 5/026 . . {fixing switch-rails to the driving means}
  
- B61L 5/04 . Fluid-pressure devices for operating points or scotch-blocks
- B61L 5/045 . . {using electrically controlled fluid-pressure operated driving means}
  
- B61L 5/06 . Electric devices for operating points or scotch-blocks {e.g. using electromotive driving means}
- B61L 5/062 . . {Wiring diagrams}
- B61L 5/065 . . {Construction of driving mechanism}
- B61L 5/067 . . {using electromagnetic driving means}
  
- B61L 5/08 . Underground actuating arrangements, e.g. for tramways
  
- B61L 5/10 . Locking mechanisms for points; Means for indicating the setting of points
- B61L 5/102 . . {Controlling electrically}
- B61L 5/105 . . {Controlling funicularly}
- B61L 5/107 . . {electrical control of points position}
  
- B61L 5/12 . Visible signals {(signalling means on the vehicle [B61L 15/00](#); signalling means for classification yards, or the like, with multiple indicating means [B61L 17/023](#); signalling means for road crossings [B61L 29/24](#); lighting in general [F21](#); visible signalling arrangements in general [G08B 5/00](#))}
- B61L 5/125 . . {Fixed signals, beacons, or the like}

- B61L 5/14 .. Form signals, e.g. semaphore arms {(illumination for points, form signals [B61L 9/00](#))}
- B61L 5/16 ... Local operating mechanisms for form signals
- B61L 5/161 .... {using electromotive driving means}
- B61L 5/162 ..... {Wiring diagrams}
- B61L 5/163 ..... {Driving mechanisms}
- B61L 5/165 .... {using electromagnetic driving means}
- B61L 5/166 .... {using electrically controlled gravity operated driving means}
- B61L 5/167 .... {using electrically controlled fluid-pressure operated driving means}
- B61L 5/168 .... {using funicular driving means}
- B61L 5/18 .. Light signals; Mechanisms associated therewith, e.g. blinders
- B61L 5/1809 ... {Daylight signals}
- B61L 5/1818 .... {using mobile coloured screen}
- B61L 5/1827 .... {using light sources of different colours and a common optical system}
- B61L 5/1836 .... {using light sources of different colours and separate optical systems}
- B61L 5/1845 .... {Optical systems, lenses}
- B61L 5/1854 .... {Mounting and focussing of the light source in a lamp, fixing means (focussing of the light source in reflecting mirrors **F21M 3/02**)}
- B61L 5/1863 .... {Lamp mountings on a mast}
- B61L 5/1872 .... {Mobile mounting arrangements on a mast; Arrangements for hoisting of the lamp along the mast}
- B61L 5/1881 .... {Wiring diagrams for power supply, control or testing}
- B61L 5/189 ... {using flashing light sources (visible signalling in general using flashing light sources [G08B 5/38](#); thermal switches operating intermittently [H01H 61/06](#), [H01H 61/08](#))}
- B61L 5/20 . Audible signals, e.g. detonator {audible signalling}
- B61L 5/203 .. {Detonators; Track mounting means; Composition of the detonative product}
- B61L 5/206 .. {Signalling means for special purposes}
- B61L 5/22 .. Devices for initiating the release of detonators in a certain position of a signal
- B61L 5/24 .. Replacement of detonators
- B61L 7/00** **Remote control of local operating means for points, signals, or trackmounted scotch-blocks** ([B61L 11/00](#) takes precedence; interlocking arrangements [B61L 19/00](#); transmission per se, see the relevant classes)
- B61L 7/02 . using mechanical transmission; e.g. wire, lever
- B61L 7/021 .. {Driving wheels or supports for traction wires}
- B61L 7/022 .. {Guiding means or supporting foundations in beton}
- B61L 7/024 .. {Coupling for wires or traction bars}
- B61L 7/025 .. {Bracing or compensating arrangements}
- B61L 7/027 .. {Control levers}
- B61L 7/028 .. { Indicating or fixing arrangements in the event of breaking or tension difference of transmission wires for points, signals or similar}

B61L 7/04	. using fluid-pressure transmitting
B61L 7/06	. using electrical transmission
B61L 7/061	.. {using electromotive driving means}
B61L 7/062	... {Wiring diagrams}
B61L 7/063	... {Construction of driving mechanism}
B61L 7/065	.. {using electromagnetic driving means}
B61L 7/066	.. {using electrically controlled fluid-pressure operated driving means}
B61L 7/067	.. {Supply for electric safety arrangements}
B61L 7/068	.. {Protection against eddy-currents, short-circuits, or the like, for electric safety arrangements}
B61L 7/08	.. Circuitry
B61L 7/081	... {Direct line wire control}
B61L 7/083	... {Common line wire control using currents of different amplitudes, polarities, frequencies, or the like}
B61L 7/085	... {Common line wire control using synchronous distributors}
B61L 7/086	... {Common line wire control using relay distributors}
B61L 7/088	... {Common line wire control using series of coded pulses}
B61L 7/10	... for light signals, e.g. for supervision, back-signalling
B61L 7/103	.... {Electric control of the setting of signals}
B61L 7/106	..... {for form signals}
<b>B61L 9/00</b>	<b>Illumination specially adapted for points, form signals, or gates (<a href="#">lighting in general F21</a>)</b>
B61L 9/02	. non-electric
B61L 9/04	. electric
<b>B61L 11/00</b>	<b>Operation of points from the vehicle or by the passage of the vehicle</b>
B61L 11/02	. Using mechanical interaction between vehicle and track
B61L 11/04	.. Trailable point locks
B61L 11/06	.. with fluid-pressure transmission
B61L 11/08	. using electrical or magnetic interaction between vehicle and track
B61L 11/083	.. {Magnetic control}
<b>B61L 13/00</b>	<b>Operation of signals from the vehicle or by the passage of the vehicle</b>
B61L 13/002	. {actuated by the passage of the vehicle}
B61L 13/005	. {optically actuated}

- B61L 13/007 . {acoustically actuated}
- B61L 13/02 . using mechanical interaction between vehicle and track {(pedals [B61L 1/00](#))}
- B61L 13/04 . using electrical or magnetic interaction between vehicle and track {e.g. by conductor circuits using special means or special conductors}
- B61L 13/042 . . {using isolated rail sections}
- B61L 13/045 . . [N. using separated rail contacts, pedals or similar ([B61L 1/02](#) takes precedence )]
- B61L 13/047 . . {controlling inductively or magnetically}
  
- B61L 15/00** **Indicators provided on the vehicle or vehicle train for signalling purposes; {**  
**On-board control or communication systems}**
- B61L 15/0009 . {wiring diagrams for start- or stop-signals on vehicles having one or more carriages and having electrical communication lines between the carriages}
- B61L 15/0018 . { Communication with or on the vehicle or vehicle train (line transmission systems [H04B 3/00](#))}
- B61L 15/0027 . . { Radio-based, e.g. using GSM-R}
- B61L 15/0036 . . { Conductor-based, e.g. using CAN-Bus, train-line or optical fibres}
- B61L 15/0045 . { Destination indicators, identification panels or distinguishing signs on the vehicles (displaying in general [G09F](#))}
- B61L 15/0054 . { Train integrity supervision, e.g. end-of-train (EOT) devices}
- B61L 15/0063 . { Multiple on-board control systems, e.g. "2 out of 3"-systems (trackside multiple control systems [B61L 27/0061](#))}
- B61L 15/0072 . { On-board train data handling (trackside train data handling [B61L 27/0077](#))}
- B61L 15/0081 . { On-board diagnosis or maintenance (trackside diagnosis or maintenance [B61L 27/0083](#))}
- B61L 15/009 . { On-board display devices}
- B61L 15/02 . Head or tail indicators, e.g. light
  
- B61L 17/00** **Switching systems for classification yards (rail brakes [B61K](#))**
- B61L 17/02 . Details, e.g. indicating degree of track filling
- B61L 17/023 . . {Signalling; Signals with multiple indicating means}
- B61L 17/026 . . {Brake devices}
  
- B61L 19/00** **Arrangements for interlocking between points and signals by means of a single interlocking device, { e.g. central control (remote control [B61L 7/00](#); station block arrangements [B61L 21/00](#))}**

B61L 19/02	· Interlocking devices having mechanical or fluid-pressure operation
B61L 19/023	.. {purely mechanical (control levers <a href="#">B61L 7/027</a> )}
B61L 19/026	.. {using fluid-pressure operated points or signals}
B61L 19/04	.. Detail- e.g. hand lever, back-signalling device
B61L 19/06	· Interlocking devices having electrical operation
B61L 19/08	.. Special arrangements for power supply for interlocking devices
B61L 19/10	.. with mechanical locks
B61L 19/12	... Details
B61L 19/14	.. with electrical locks
B61L 19/16	... Details
<b>B61L 21/00</b>	<b>Station blocking between signal boxes in one yard</b> (interlocking between points and signals by means of a single interlocking device <a href="#">B61L 19/00</a> )
B61L 21/02	· Mechanical locking and release of the route; Repeat locks; Coupling of semaphores
B61L 21/04	· Electrical locking and release of the route; Electrical repeat locks {(central interlocking <a href="#">B61L 19/00</a> )}
B61L 21/06	· Vehicle-on-line indication; Monitoring locking and release of the route
B61L 21/065	.. {for signals, including signals actuated by the vehicle}
B61L 21/08	· Order transmission and reception arrangements for giving or withholding permission
B61L 21/10	· Arrangements for trains which are closely following one another (automatic central traffic control systems <a href="#">B61L 27/04</a> )
<b>B61L 23/00</b>	<b>Control, warning, or like safety means along the route or between vehicles or vehicle trains</b>
B61L 23/002	· {Control or safety means for heart-points and crossings of aerial railways, funicular rack-railway (points or safety systems for model railways <a href="#">A63H</a> ; points, crossings or hearts for aerial railway, funicular rack railway <a href="#">E01B 25/12</a> )}
B61L 23/005	.. {Automatic control or safety means for points for operator-less railway, e.g. transportation systems}
B61L 23/007	· {Safety arrangements on railway crossings}
B61L 23/02	· for indicating along the route the failure of brakes
B61L 23/04	· for monitoring the mechanical state of the route
B61L 23/041	.. { Obstacle detection}
B61L 23/042	.. { Track changes detection}
B61L 23/044	... { Broken rails}
B61L 23/045	... { Rail wear}
B61L 23/047	... { Track or rail movements}

- B61L 23/048 . . . { Road bed changes, e.g. road bed erosion}
- B61L 23/06 . for warning men working on the route
- B61L 23/08 . for controlling traffic in one direction only (station blocking between signal boxes in one yard [B61L 21/00](#))
- B61L 23/10 . . manually operated {e.g. block arrangements}
- B61L 23/12 . . partly operated by train
- B61L 23/14 . . automatically operated
- B61L 23/16 . . . Track circuits specially adapted for section blocking
- B61L 23/161 . . . . {using current of indifferent sorte or a combination of different current types}
- B61L 23/163 . . . . {using direct current}
- B61L 23/165 . . . . {using rectified alternating current}
- B61L 23/166 . . . . {using alternating current}
- B61L 23/168 . . . . {using coded current}
- B61L 23/18 . . . specially adapted for changing lengths of track sections in dependence upon speed and traffic density
- B61L 23/20 . . . with transmission of instructions to stations along the route
- B61L 23/22 . for controlling traffic in two directions over the same pair of rails (station blocking between signal boxes in one yard [B61L 21/00](#))
- B61L 23/24 . . using token systems, e.g. train staffs, tablets
- B61L 23/26 . . with means for actuating signals from the vehicle or by passage of the vehicle
- B61L 23/28 . . using non-automatic blocking from a place along the route
- B61L 23/30 . . using automatic section blocking
- B61L 23/32 . . . with provision for the blocking or passing sidings
- B61L 23/34 . Control, warnings or like safety means indicating the distance between vehicles or vehicle trains by the transmission of signals therebetween
- B61L 25/00      Recording or indicating positions or identities of vehicles or vehicle trains or setting of track apparatus**
- B61L 25/02 . Indicating or recording positions or identities of vehicles or vehicle trains
- B61L 25/021 . . {Measuring and recording of train speed}
- B61L 25/023 . . { Determination of driving direction of vehicle or vehicle train}
- B61L 25/025 . . { Absolute localisation, e.g. providing geodetic coordinates}
- B61L 25/026 . . { Relative localisation, e.g. using odometer}
- B61L 25/028 . . { Determination of vehicle position and orientation within a train consist, e.g. serialisation}
- B61L 25/04 . . Indicating or recording train identities
- B61L 25/041 . . . {using reflecting tags}
- B61L 25/043 . . . {using inductive tags}
- B61L 25/045 . . . {using reradiating tags}
- B61L 25/046 . . . {using magnetic tags}



- B61L 25/048 . . . {using programmable tags}
- B61L 25/06 . Indicating or recording the setting of track apparatus, e.g. of points, of signals
- B61L 25/065 . . {for signalling systems on the vehicle using current conduction}
- B61L 25/08 . . Diagrammatic displays
- B61L 27/00 Central traffic control systems; { Track-side control or specific communication systems}**
- B61L 27/0005 . { Details of track-side communication}
- B61L 27/0011 . { Regulation, e.g. scheduling, time tables}
- B61L 27/0016 . . { Preparing schedules}
- B61L 27/0022 . . { Following schedules}
- B61L 27/0027 . . { Track-side optimisation of vehicle or vehicle train operation (on-board optimisation [B61L 3/006](#))}
- B61L 27/0033 . . { Crew rosters and itineraries}
- B61L 27/0038 . { Track-side control of safe travel of vehicle or vehicle train, e.g. braking curve calculation (on-board target speed calculation and supervision [B61L 3/008](#))}
- B61L 27/0055 . { Testing or simulation}
- B61L 27/0061 . { Track-side multiple control systems, e.g. switch-over between different systems, "2 out of 3"-systems (on-board multiple control systems [B61L 15/0063](#))}
- B61L 27/0066 . . { Backup systems, e.g. switching when failures occur}
- B61L 27/0072 . . { Migration, e.g. parallel installations running simultaneously}
- B61L 27/0077 . { Track-side train data handling, e.g. vehicle or vehicle train data, position reports (on-board train data handling [B61L 15/0072](#))}
- B61L 27/0083 . { Track-side diagnosis or maintenance, e.g. software upgrades (on-board diagnosis or maintenance [B61L 15/0081](#))}
- B61L 27/0088 . . { for track-side elements or systems, e.g. trackside supervision of trackside control system conditions}
- B61L 27/0094 . . { for vehicles or vehicle trains, e.g. trackside supervision of train conditions}
- B61L 27/02 . Manual systems
- B61L 27/04 . Automatic systems, e.g. controlled by train; Change-over to manual control
- B61L 29/00 Safety means for rail/road crossing traffic**
- B61L 29/02 . Guards or obstacles for preventing access to the route (cattle guards connected to the permanent way [E01B 17/00](#))
- B61L 29/023 . . {Special gates}
- B61L 29/026 . . . { Preventing access by means of obstacles raising across the route}
- B61L 29/04 . Gates for level crossings

B61L 29/06	.. yielding to vehicles in one direction but operated in a different direction
B61L 29/08	. Operation of gates; Combined operation of gates and signals
B61L 29/10	.. Means for securing gates in their desired position
B61L 29/12	.. Manual operation
B61L 29/14	... mechanically
B61L 29/16	... electrically
B61L 29/18	.. Operation by approaching rail vehicle or rail vehicle train
B61L 29/20	... mechanically
B61L 29/22	... electrically
B61L 29/222	.... {using conductor circuits with separate contacts or conductors}
B61L 29/224	..... {using rail contacts}
B61L 29/226	.... {using track-circuits, closed or short-circuited by train or using isolated rail-sections}
B61L 29/228	.... {using optical means}
B61L 29/24	. Means for warning road traffic that a gate is closed or closing, or that rail traffic is approaching, e.g. for visible or audible warning
B61L 29/243	.. {Transmission mechanism or acoustical signals for gates}
B61L 29/246	.. {Signals or brake- or lighting devices mounted on the road vehicle and controlled from the vehicle train}
B61L 29/26	.. mechanically operated
B61L 29/28	.. electrically operated
B61L 29/282	... {magnetic or inductive control by the vehicle}
B61L 29/284	... {using rail-contacts, rail microphones, or the like, controlled by the vehicle}
B61L 29/286	... {using conductor circuits controlled by the vehicle}
B61L 29/288	... {Wiring diagram of the signal control circuits}
B61L 29/30	... Supervision, e.g. monitoring arrangements
B61L 29/32	... Timing, e.g. advance warning of approaching train
<b>B61L 99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
<b>B61L 2003/00</b>	<b>Devices along the route for controlling devices on the vehicle or vehicle train, e.g. to release brake, to operate a warning signal</b>
B61L 2003/02	. at selected places along the route, e.g. intermittent control {simultaneous mechanical and electrical control}
B61L 2003/08	.. controlling electrically
B61L 2003/12	... using magnetic or electrostatic induction; using radio waves
B61L 2003/121	.... {using magnetic induction}
B61L 2003/122	..... German standard for inductive train protection, called "Induktive Zugsicherung"[INDUSI]
B61L 2003/123	..... French standard for inductive train protection, called "Contrôle de vitesse"

par balises" [KVB]

- B61L 2003/16 . Continuous control along the route
- B61L 2003/22 . . using magnetic or electrostatic induction; using electromagnetic radiation
- B61L 2003/221 . . . {using track circuits}
- [B61L 2003/223](#) . . . . French cab signaling system, called "Transmission Voie-Machine" [TVM]
- B61L 2003/225 . . . {using separate conductors along the route}
- [B61L 2003/226](#) . . . . German inductive continuous train control, called 'Linienzugbeeinflussung' [LZB]
- [B61L 2003/228](#) . . . Constructional details
  
- B61L 2011/00      Operation of points from the vehicle or by the passage of the vehicle**
  
- B61L 2011/08 . using electrical or magnetic interaction between vehicle and track
- [B61L 2011/086](#) . . German radio based operations, called "Funkfahrbetrieb" [FFB]
  
- B61L 2019/00      Arrangements for interlocking between points and signals by means of a single interlocking device, { e.g. central control (remote control [B61L 7/00](#); station block arrangements [B61L 21/00](#))}**
  
- B61L 2019/06 . Interlocking devices having electrical operation
- [B61L 2019/065](#) . . with electronic means
  
- B61L 2027/00      Central traffic control systems; { Track-side control or specific communication systems}**
  
- B61L 2027/0038 . { Track-side control of safe travel of vehicle or vehicle train, e.g. braking curve calculation (on-board target speed calculation and supervision [B61L 3/008](#))}
- [B61L 2027/0044](#) . . using European Train Control System (ETCS)
- [B61L 2027/005](#) . . using Communication-based Train Control (CBTC)
  
- [B61L 2201/00](#)      Control methods**
  
- [B61L 2201/02](#) . Fuzzy control
  
- [B61L 2205/00](#)      Communication or navigation systems for railway traffic**
  
- [B61L 2205/02](#) . Global system for mobile communication - railways (GSM-R)
- [B61L 2205/04](#) . Satellite based navigation systems, e.g. GPS
  
- [B61L 2207/00](#)      Features of light signals**

B61L 2207/02 . using light-emitting diodes (LEDs)

**B61L 2210/00 Vehicle systems**

B61L 2210/02 . Single autonomous vehicles

B61L 2210/04 . Magnetic elevation vehicles (maglev)